

REMARKS

The present amendments and remarks are in response to the Office Action of September 16, 2004. Claims 13-16 are currently pending.

Reconsideration of the application is respectfully requested in view of the following responsive remarks. For the Examiner's convenience and reference, the Applicant's remarks are presented in the order in which the corresponding issues were raised in the Office Action.

In the Office Action, the following rejections were made:

- (1) claims 13 and 15 were rejected under 35 U.S.C. 102(e) as being anticipated by U.S. 2004/0171779 (hereinafter "779"); and
- (2) claims 14 and 16 were rejected under 35 U.S.C. 103(a) as being unpatentable over '779 in view of U.S. Pat No. 6,627,314 (hereinafter "314"); and
- (3) claims 13-15 were rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over U.S. 2001/0043495 (herein after "495").

Rejection under 35 U.S.C. 102(e) over '779

The Examiner has rejected claims 13 and 15 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Application '779. The '779 application discloses many different processes for preparing various copolymers, some of which include controlled polymerization processes comprising polymerizing free radically (co)polymerizable monomers. The free radically (co)polymerizable monomers can be polymerized in the presence of an initiator having a radically transferable atom and a catalyst which participates in a reversible cycle with at least one of the initiator and a compound having a radically transferable atom.

According to the specification, a preferred process is a reverse atom transfer radical polymerization (ATRP) process. As recited by '779, a reverse ATRP process includes initiator molecule which can be formed in-situ by reaction of a free radical with a redox conjugate of a transition metal compound. See paragraph [006]. Another exemplary embodiment recites a process for forming an AB block copolymer. Specifically, the block copolymer has a hydrophilic block and a more hydrophobic block that only incorporates hydrophilic monomers at low levels, leading to surfactant molecules with tunable micellar properties. See paragraph [0169].

Unlike the teachings of the '779 publication, the claimed polymer particles are prepared by the process of: i) polymerizing a first unsaturated monomer containing a hydrophilic moiety, through an ATRP process to form a first polymer; and ii) copolymerizing a second unsaturated monomer containing a hydrophobic moiety, with the first polymer in an emulsion, to form amphipathic block copolymer particles having a size range of 50-500nm and a polydispersity index in the range of 1-1.2. Thus, the claimed invention requires an ordered copolymerization process. In other words, the formation of a hydrophilic polymer is at least well under way (or even substantially complete) when the second hydrophobic monomer is added. Further, the ATRP process is utilized in preparing a controlled hydrophilic moiety-containing block, and an emulsion process is used for preparing the hydrophobic moiety-containing block. As the Examiner is aware, the order and method by which the polymer is formed dictates the resulting composition, shape, and configuration of individual polymers of the block copolymer. The Applicant has four such specific order and method requirements that

influence the final configuration of the product, i.e. hydrophilic first, hydrophobic second, ATRP for hydrophilic, and emulsion for hydrophobic. For instance, forming the hydrophilic polymer through an ATRP process in the first stage produces a particular polymer particulate structure, such as a homopolymer structure or a polymer structure that includes crosslinkers or dye monomers, for example. If, at a second stage, a second hydrophobic block monomer is polymerized to the first polymer (which is already at least partially formed) via an emulsion process, the resultant polymer would be an amphipathic particle displaying a unique particle structure and characteristics that can not be duplicated except through an ordered process incorporating the different types of polymerization methods as described above. For example, the hydrophobic polymerization results in a hydrophobic block that is structured in accordance with its relationship to the hydrophilic block. Further, the hydrophilic block is at least initially polymerized without the presence of the hydrophobic monomers, thus, are not influenced in their formation as a hydrophilic block until the hydrophobic monomers are added. Thus, as the '779 application does not teach a process of forming block copolymers in accordance with the recited method, it follows that none of the products formed therein would have the same structure.

Accordingly, the instantly claimed invention is not anticipated by the cited reference, as Application '779 lacks at least one element of the instantly claimed invention. Applicant submits that the rejection is moot and respectfully requests that it be withdrawn.

Rejection under 35 U.S.C. 103(a) over '779 in view of '314

Before discussing the obviousness rejections herein, it is thought proper to briefly state what is required to sustain such a rejection. The issue under § 103 is whether the PTO has stated a case of *prima facie* obviousness. According to the MPEP § 2142, the Examiner has the burden and must establish a case of *prima facie* obviousness by showing some motivation in a prior art reference to modify that reference, or combine that reference with multiple references, to teach all the claim limitations in the instant application. Applicants respectfully assert the Examiner has not satisfied the requirement for establishing a case of *prima facie* obviousness in this rejection.

Claims 14 and 16 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application '779 in view of U.S. Patent No. '314. The Examiner has stated that the '779 application does not specifically disclose the use of a polymerizable dye as a comonomer. Thus, the Examiner has also cited the '314 patent which recites a process for preparing nanocomposite particles by polymerizing monomers onto a functional inorganic colloid. More specifically, the Examiner has cited '314 because it teaches that a UV-absorbing chromophore may be attached to the functionalized particle. However, the '314 patent teaches that the UV-absorbing chromophores are incorporated onto nanocomposite particles through surface attachment. The chromophore is used to confirm and measure the number of attached initiator functional groups prior to polymerization through UV light absorption. The specific UV-absorbing chromophore (bithiophene-chlorosilane) was reacted with silicate particles (inorganic particles) treated with monoalkoxysilane to accomplish the surface attachment (See column 25, lines 54-60). However, nothing in '314 teaches that a polymerizable dye may be copolymerized with a particle, or more specifically, that a dye may be copolymerized with a hydrophilic monomer in a first stage or an ordered process to form an amphipathic polymer particle. Further, the '314 patent is devoid of any motivation to modify the reaction from a surface attachment to polymerization of the chromophore to a nanocomposite particle, and even more specifically, by polymerizing the chromophore through an ATRP process.

Furthermore, the '314 reference can not be combined with the '779 patent to illustrate the presently claimed invention. As explained above, the '779 lacks the teaching of polymerizing a dye moiety with unsaturated monomers through an ATRP process, and the '314 patent teaches only that chromophores can be attached to the surface of certain particles. These teachings are inapposite to one another (copolymerization compared to surface attachment). In other words, the lack of teaching or suggestion in the '779 patent to add a polymerizable dye can not give rise to the combining of '314 to arrive at the claimed invention. Likewise, the lack of a teaching or suggestion that dye-monomers can be copolymerized within a polymer also can not give rise to the proposed combination. Reconsideration of this rejection is respectfully requested.

With regards to claim 16, as this claim is dependent on claim 13, and claim 13 is believed to be in allowable condition, Applicant respectfully requests that this rejection be withdrawn as well.

Rejection in view of '495 under 102(b) or 103(a)

Claims 13-15 were rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, as obvious over U.S. Patent Application '495. The '495 reference teaches a method for using polymer nanocomposite materials for three-dimensional optical memory storage. The Examiner, however, has cited paragraphs [0090] and [0091] as teachings of the claimed invention. Paragraph [0090] recites a nanocomposite material with a periodic structure. The nanocomposite material is essentially a core/shell polymer particle prepared by particles having rigid cores and softer shells. Paragraph [0090] also recites the core-shell particles have poly(methyl methacrylate)(PMMA) cores and poly(methyl methacrylate)-poly(butyl methacrylate) shells prepared by a multistage emulsion polymerization process. According to this example, the core/shell particles do not exhibit true amphipathic characteristics since the starting materials are essentially of similar monomer types.

Conversely, Applicants have provided amphipathic particles prepared by the process of i) polymerizing a first unsaturated monomer containing a hydrophilic moiety, through an ATRP process to form a first polymer; and ii) copolymerizing a second unsaturated monomer containing a hydrophobic moiety, with the first polymer in an emulsion, to form amphipathic block copolymer particles having a size range of 50-500nm and a polydispersity index in the range of 1-1.2. Further, preferred hydrophobic monomers used in the present invention have been disclosed such as, methyl methacrylate and butyl methacrylate (See page 5, line 23). In other words, exemplary hydrophobic monomers of the present invention are the same type of monomers used to form the poly(methyl methacrylate) and poly(methyl methacrylate)-poly(butyl methacrylate), i.e. both the core and shell polymers recited in paragraph [0090]. Since '495 utilizes similar hydrophobic monomers to form the polymer particles, the reference lacks the needed hydrophilic moiety-containing monomer required by the presently pending claims. Without the hydrophilic moiety-containing monomers, the amphipathic

particles of the present application would not be formed. As such, the resultant particles of the '495 disclosure are not equivalent to the currently claimed particles.

Regarding claim 14, according to Example 1, paragraph [0091], a fluorescent comonomer 4-amino-7-nitrobenzo-2-oxa-1,3-diazol-methacrylate (NBD-MA) was synthesized and copolymerized with poly(methyl methacrylate) (PMMA). The resultant particle was a NBD-MA/PMMA core/shell polymer. Further, regarding claim 15, the diffusion of the PMMA molecules from the cores to the shells was suppressed by cross-linking the core-forming polymer.

Despite these two specific teachings, it should be noted that the particle recited in paragraphs [0090] and [0091] are not the same as the claimed amphipathic particles. In other words, the particles disclosed in '495 are prepared from comonomers which form the core, then are further prepared by polymerizing the comonomers with another similar monomer to form the core/shell polymer. The particles formed by this method can not be equivalent to the claimed amphipathic particles which are formed by polymerizing a hydrophilic monomer in an ATRP process to form a first polymer, then copolymerizing the first polymer with a hydrophobic monomer through an emulsion process to obtain the claimed amphipathic particle. The claimed amphipathic particles prepared by this process exhibits true amphipathic characteristics and have a predictable uniform shape and density, which is achieved by the process that defines the product.

Accordingly, the instantly claimed invention is not anticipated by the cited reference, as the '495 application lacks at least one element of the instantly claimed invention. Applicant submits that this rejection is improper, and respectfully requests that it be withdrawn. Further, there is no suggestion for modification of this reference to arrive at the claimed invention, as there is not suggestion of any desire to form amphipathic particles. Reconsideration on these grounds is respectfully requested.

CONCLUSION

In view of the foregoing, Applicant believes that claims 13-16 present allowable subject matter and allowance is respectfully requested. If any impediment to the allowance of these claims remains after consideration of the above remarks, and such impediment could be removed during a telephone interview, the Examiner is invited to telephone Susan E. Heminger at (650) 236-2738 so that such issues may be resolved as expeditiously as possible.

Please charge any additional fees except for Issue Fee or credit any overpayment to Deposit Account No. 08-2025.

Dated this 16th day of December, 2004.

Respectfully submitted,



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